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HAUGHTON-MARS PROJECT 2000

July 2000

The Haughton-Mars Project (HMP) is a NASA-led international research program centered on the scientific study of the Haughton impact crater and its surroundings. The Haughton Crater's remote, polar desert environment is studied by researchers because it is an analog to Mars. Mars analogs are places on Earth where environmental conditions, geologic features and/or biology approximate those of Mars – now or early in its history. Haughton-Mars Project 2000 researchers will study Haughton Crater's rich geologic features and "extremophile" biology, gaining insights into the evolution of Mars, the effects of impacts on early earth (when it was more Mars-like) and the search for life in extreme environments.

Haughton Crater is located at 75/22' N, 89/41'W on Devon Island, Nunavut, the Arctic, Canada. It is accessed by air from Resolute Bay, Cornwallis Island.

The Research

The HMP-2000 field season includes both science and exploration studies. The science program at Haughton involves three areas of research: geology, biology and environmental sciences. It will compare the Earth and Mars, study the effects of meteorite impacts on Earth, and examine life on Earth in the extreme polar environment of the high Arctic. A brief synopsis of each area of the science program follows.

Geology Studies:

- Impact Geology: A wide variety of sites will be visited and explored on foot, by ATV and by helicopter. The research emphasis will be on studying exposed faults, collecting rock samples and analyzing in-situ petrographics.
- Periglacial: Ground- and aerial-based surveys of periglacial formations will be conducted by researchers at Haughton using an unmanned tethered balloon and helicopter.
- Valley Formation: To understand the origin of the valleys and canyons at Haughton, teams will conduct ground and aerial surveys using ATVs, an unmanned tethered balloon and a helicopter.

Biology Studies:

- Impact Crater Biology: Researchers will survey the biology of Haughton Crater and its surroundings in several ways - on foot, by ATV, by inflatable boat, by robotic imaging hopper and by helicopter.

- Lacrustrine Microbiology: Scientists will explore the larger lakes at Haughton to characterize the microbiology of their water, taking and analyzing core samples from lake sediments.
- Lithic Microbiology: A variety of locations will be visited by researchers who will sample a wide range of rocks in order to characterize their unique microbiologies.

Environmental Science Studies:
The experiments and sorties for Environmental Science Studies at HMP-2000 are currently being finalized.

In addition to the science program, HMP-2000 researchers will conduct a rigorous exploration research program, investigating the technologies, strategies, human factors and hardware designs relevant to the future exploration of Mars and other planets using robots and humans. HMP's exploration research is divided into three main areas -- Information Systems, Robotics and Human Exploration. A brief synopsis of each follows.

Information Systems Studies:
Researchers will define and test complex communications architectures and information systems for future exploration. Research will focus on:

- Human-Centered Computing – Scientists will systematically investigate how humans live and work in extreme environments, “shadowing” researchers in the field, at rest and during extra-vehicular activities (EVAs).

- Mobile Exploration Technologies – The mobile exploration (MEX) team will deploy and test a variety of radio communications systems at Haughton Crater.

Robotics Studies:
Researchers will conduct field tests of robotic vehicles at the Crater to help define the robotic systems requirements for future human Mars missions.

Human Exploration Studies:
Scientists will plan and execute field sorties and traverses, define science protocols and instruments, and field test equipment prototypes for space exploration (such as gloves, suits, tools and roving vehicles). Human Exploration Studies will include:

- The ExPOC Mission Support Experiment: This research involves daily links over a three-week period with the new Exploration Planning and Operations Center at NASA’s Johnson Space Center in Houston, TX. A central research goal is study how human space missions might be supported by ground controllers.

- The Hamilton-Sundstrand Mars Suit Study : This research involves the field deployment of a spacesuit prototype which is currently under design for future Mars exploration.

The HMP-2000 Team

There are approximately 25 NASA researchers involved in HMP-2000, as well as researchers from other institutions and organizations. (Please see the HMP Sponsors section for further information.) There will be approximately 30 researchers in the field at Haughton Crater at any one time. The HMP-2000 team is divided into three categories: Science Teams, Exploration Research Teams and Field Support Teams. HMP-2000 team member biographies may be found on the HMP-2000 website: http://www.arctic-mars.org

Key personnel include:

Dr. Pascal Lee, of Mountain View, CA-based SETI Institute, is Principal Investigator and Project Leader for HMP-2000 science experiments, field work, tests and experiments

Dr. Kelly Snook, a research scientist at NASA Ames Research Center (NARC) in Mountain View, CA, is HMP Project Manager and NASA spokesperson

Anthony Griffith, NASA Johnson Space Center, is Lead of the Human Exploration Operations Team

Dr. Richard Alena, Nasa Ames Research Center, is Lead, Wireless Communications Studies

Dr. Chris McKay, Nasa Ames Research Center, leads Life in extreme Environments Studies

Dr. Carol Stoker, NASA Ames Research Center, is Lead, Rover/robotics Tests

Dr. Brian Glass, NASA Ames Research Center, is Hazard Avoidance Software Lead

Dr. Charles Cockell, British Antarctic Survey, is the Astrobiology/Biology Lead

Dr. Gordon Osinski, University of New Brunswick, is Geology Studies Lead

Dr. Victor Stolc, Stanford University, is Stanford Genome Center, DNA Sequencing Lead

Dr. Stephen Braham of Simon Fraser University is Mobile Exploration Hardware Test Lead

HMP Sponsors

HMP is sponsored and funded primarily by NASA. Other supporting, collaborating, licensing or participating sponsors include government agencies, research institutions, societies and corporations. A partial list follows. A complete list of sponsors may be found on the HMP-2000 website: http://www.arctic-mars.org

Government Agencies

- NASA
- British Antarctic Survey
- Canadian Space Agency
- Polar Continental Shelf Project
- United States Marine Corps
- National Research Council

Research Institutions

- Carnegie Mellon University
- Massachusetts Institute of Technology
- SETI Institute
- Yale University
- Scripps Institute
- Simon Fraser University

Societies

- The Mars Society
- The National Geographic Society

Corporations

- Adobe Systems, Inc.
- Canon, Inc.
- Mountain Hard Wear, Inc.
- Komatik Designs
- Campbell Scientific, Inc.

Other Research at Haughton Crater

The Mars Arctic Research Station (TMARS), operated by the Colorado-based Mars Society, is a separate research effort at Haughton Crater. The Mars Arctic Research Station will be established on Haynes Ridge, .6 of a mile from the HMP Base Camp, to test technology and equipment that one day may be sent to Mars. Selected researchers will work inside the habitat during the field season--conducting human factors, team dynamics and other studies. Dr. Pascal Lee is Project Scientist for the Mars Society Mars Arctic Research Station.

Web Information

For in-depth descriptions of HMP-2000 experiments, field updates, researcher biographies and other data, go to:
http://www.arctic-mars.org

To learn more about the media field site opportunity at Haughton Crater, go to:
http://george.arc.nasa.gov/dx/basket/pressrelease/00_45AR.html

To obtain information about Nunavut, go to:
http://www.arctic-travel.com
http://www.nunavut.worldweb.com

Contact Information

For further information, contact:

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